

**UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF NORTH CAROLINA**

DEMOCRACY NORTH CAROLINA, THE LEAGUE
OF WOMEN VOTERS OF NORTH CAROLINA,
DONNA PERMAR, JOHN P. CLARK, MARGARET
B. CATES, LELIA BENTLEY, REGINA WHITNEY
EDWARDS, ROBERT K. PRIDDY II, WALTER
HUTCHINS, AND SUSAN SCHAFFER,

Plaintiffs,

v.

THE NORTH CAROLINA STATE BOARD OF
ELECTIONS; DAMON CIRCOSTA, in his official
capacity as Chair of the State Board of Elections;
STELLA ANDERSON, in her official capacity as
Secretary of the State Board of Elections; KEN
RAYMOND, in his official capacity as Member of
the State Board of Elections; JEFF CARMON III, in
his official capacity as Member of the State Board of
Elections; DAVID C. BLACK, in his official capacity
as Member of the State Board of Elections; KAREN
BRINSON BELL, in her official capacity as Executive
Director of the State Board of Elections; THE NORTH
CAROLINA DEPARTMENT OF
TRANSPORTATION; J. ERIC BOYETTE, in his
official capacity as Transportation Secretary; THE
NORTH CAROLINA DEPARTMENT OF HEALTH
AND HUMAN SERVICES; MANDY COHEN, in her
official capacity as Secretary of Health and Human
Services,

Defendants,

and

PHILIP E. BERGER, in his official capacity as
President Pro Tempore of the North Carolina Senate,
and TIMOTHY K. MOORE, in his official capacity as
Speaker of the North Carolina House of
Representatives,

Defendant Intervenors.

Civil Action No. 20-cv-00457

Expert Report of Theodore Plush, D.O.

1. I, Theodore Plush, D.O., do hereby attest that I am a physician licensed to practice medicine in the state of New Jersey and that I am board certified in internal medicine, pulmonary medicine and critical care medicine. I have been a practicing physician for 9 years, researching and treating patients with a variety of infectious respiratory illnesses. I am a pulmonary and critical care medicine attending at Inspira Medical Center in Mullica Hill, New Jersey, and an adjunctive professor of critical care medicine affiliated with Cooper University Hospital. I train, supervise and otherwise work with residents and critical care fellows-in-training. A copy of my CV is attached hereto as Exhibit A. During the first half of 2020, a novel coronavirus (SARS-CoV-2) (“COVID-19”) devastated the world, and I shifted my focus to studying this virus and caring for the patients afflicted by it. My state of New Jersey was hit particularly hard by the virus, and I spent the last several months on the front lines caring for these patients. Through my education, training, review of the medical literature, and my other professional activities, I am familiar with the most current research and guidelines related to COVID-19, which I implement daily.

2. I further attest that this is my first appearance as an expert witness, that I am not a party to this litigation, that I am not an employee or partner of any party to this litigation, and that I am not an employee or stockholder of any professional corporation of which any party is a stockholder. I am being compensated in the amount of \$250 dollars per hour worked.

OVERVIEW OF SARS-COV-2

3. SARS-CoV-2 is the causative agent of a world-wide viral pandemic leading to the illness that is now called Coronavirus Disease 2019 (“COVID-19”). The transmission of SARS-CoV-2 is mainly person-to-person, through respiratory secretions and saliva. Infected droplets of fluid from the nose or mouth can be generated and emitted during coughing, sneezing and,

occasionally, talking.¹ Infection can occur after close-range contact, if these respiratory droplets come into contact with a person's mucus membranes. Indirect infection, through touching of an infected surface then touching one's eyes, nose or mouth, may be possible, but it is not the main way that the virus is spread. These are the only two known and undisputed ways for the virus to spread. The notion that there may be airborne transmission of SARS-CoV-2 is controversial and the results are mixed. In a Hong Kong hospital, a COVID-19 positive patient placed in an open ward came in close contact with 10 other patients and 7 staff members, none of which were protected with n95 respirators. After 28 days of surveillance, all the close contacts remained asymptomatic and there were no positive cases identified.² Similarly, air samples taken from 6 separate COVID-19 positive patients, singly isolated in a negative pressure room, were negative for SARS-CoV-2 RNA.³ Conversely, a study from China did find SARS-CoV-2 positive aerosols in 14 out of the 40 rooms tested containing COVID-19 positive intensive care unit patients.⁴ Importantly, the World Health Organization (WHO) acknowledges that "airborne spread has not been reported for COVID-19 and it is not believed to be a major driver of

¹ Rajiv Dhand and Jie Li, *Coughs and Sneezes: Their Role in Transmission of Respiratory Viral Infections, Including SARS-CoV-2*, AM. J. OF RESPIRATORY AND CRITICAL CARE MEDICINE (2020), <https://bit.ly/3113Via>.

² S. C. Y. Wong, et al., *Risk of nosocomial transmission of coronavirus disease 2019: an experience in a general ward setting in Hong Kong*, 105 J. HOSP INFECT. 119 (Apr. 4, 2020), <https://bit.ly/2Z4cuv6>.

³ Vincent Chi-Chung Cheng, MD, et al., *Air and environment sampling for SARS-CoV-2 around hospitalized patients with coronavirus disease 2019 (COVID-19)*, CAMBRIDGE UNIV. PRESS 1 (June 2020), <https://bit.ly/2NvgoYy>.

⁴ Z. Guo, et al., *Aerosol and Surface Distribution of Severe Acute Respiratory Syndrome Coronavirus 2 in Hospital Wards, Wuhan, China, 2020*, 26 EMERGING INFECTIOUS DISEASES 1583 (2020), <https://bit.ly/2NwXikU>.

transmission based on available evidence” after an analysis of 75,465 COVID-19 cases in China, reported no evidence of airborne transmission.⁵

4. Symptoms of COVID-19 resemble a flu-like illness, with fever, cough and shortness of breath being the most common manifestations. Additional symptoms include chills, muscle pains, sore throat, headache and loss of taste or smell.⁶ Gastrointestinal symptoms (such as nausea and diarrhea) have also been reported. The most severe manifestations include acute respiratory distress syndrome, an intense and unregulated inflammatory response (cytokine storm), thromboembolic disease (pulmonary embolism and stroke) and cardiac issues (arrhythmias cardiomyopathy, shock).⁷ Being on the front lines fighting this virus, I have had extensive first-hand experience caring for COVID-19 patients. The majority of my intensive care case load have been elderly patients from nursing homes. Most of the non-long-term care facility patients that tested positive did not require hospitalization, and of those that did, nearly all were able to be discharged home. As we learned more about the virus and possible treatment strategies, our outcomes continued to improve.

5. Patients who have the highest risk for developing severe disease and death are those over 65 years, those residing in a nursing home or long-term care facility and those with a

⁵Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19), WHO (Feb. 28, 2020), <https://bit.ly/3eCvjfp>.

⁶ CORONAVIRUS DISEASE 2019 SYMPTOMS, CDC (last visited June 25, 2020), <https://bit.ly/3g0I5oo>.

⁷ JM Pericas, *et al.*, *COVID-19: from epidemiology to treatment*, 41 EUR. HEART J. 2092 (June 2020), <https://bit.ly/2Zd17AS>.

significant underlying medical condition (chronic lung disease, heart disease, immunocompromised state, obesity, diabetes or chronic kidney disease).⁸

6. The Center for Disease Control and Prevention (“CDC”) in China published a report of 44,415 confirmed cases of COVID-19. Mild disease, severe disease and critical disease were reported in 81%, 14% and 5% of patients, respectively.⁹ Interestingly, only 1% of the patients in this report were asymptomatic. Higher numbers of asymptomatic COVID-19 patients have been reported in other studies, however this highlights that most patients who contract COVID-19 suffer from only mild disease or are asymptomatic. The total case fatality rate was only 2.3% but increased to over 14% in patients over 80 years old. Another report from China found the overall mortality rate to be 1.4% among 1,099 COVID-19 positive patients, however, the median age of the patients was only 47 years.¹⁰ When focusing on older patients in long term care facilities, the mortality rate is significantly increased, reaching over 33% at one nursing home in Washington State.¹¹ Although only intended to advance public health preparedness and planning, the United States CDC developed 5 scenarios based on a set of numerical values for biological and epidemiological characteristics of COVID-19. The scenario with the current best

⁸ *Coronavirus Disease 2019 Who is at Increased Risk for Severe Illness?*, CDC (last visited June 25, 2020), <https://bit.ly/381QIS2>.

⁹ Zunyou Wu, MD, PhD and Jennifer M. McGoogan, PhD, *Characteristics of and Important Lessons from the Coronavirus Disease 219 (COVID-19) Outbreak in China*, JAMA NETWORK (Feb. 24, 2020), <https://bit.ly/385IAuG>.

¹⁰ Wei-jie Guan, PhD, *et al.*, *Clinical Characteristics of Coronavirus Disease 2019 in China*, 382 N. ENG. J. OF MEDICINE 1708 (Apr. 30, 2020), <https://bit.ly/381QZ1U>.

¹¹ Temet M. McMichael, *et al.*, *Epidemiology of Covid-19 in a Long-Term Care Facility in King County, Washington*, 382 N. ENG. J. OF MEDICINE 2005 (May 21, 2020), <https://bit.ly/2Ywvt2o>.

estimate, which accounts for the likely number of asymptomatic patients, places the possible overall fatality rate at 0.4% with a symptomatic case hospitalization ratio of only 3.4%.¹² This is similar to a model-based analysis of the data from Mainland China, which estimates the overall infection fatality ratio for China to be 0.66%.¹³

1. Is there a substantial risk that an infection with COVID-19 acquired during voting in-person in North Carolina in the fall could result in symptomatic disease, hospitalization or death?

7. Adherence to CDC Guidelines for mitigating the risk of COVID-19 infection, as well as ensuring that high-risk individuals either take extra safety precautions or utilize absentee ballots, eliminates the premise of substantial risk of exposure while voting at a poll booth. These guidelines include healthy hygiene practices, staying at home when sick, practicing physical distancing to lower the risk of disease spread, and the use of a cloth face covering.

8. Patients who have the highest risk for developing severe disease and death are those over 65 years, those residing in a nursing home or long-term care facility and those with a significant underlying medical condition (chronic lung disease, heart disease, immunocompromised, obesity, diabetes or chronic kidney disease).¹⁴ According to the Kaiser Family Foundation's research study, 39% of adults over the age of 18 in North Carolina meet the above criteria and are considered at a higher-risk for serious complications from COVID-19, if

¹² CORONAVIRUS DISEASE 2019 PANDEMIC PLANNING SCENARIOS, CDC (last visited June 25, 2020), <https://bit.ly/3fYrWzB>.

¹³ Robert Verity, PhD, *et al.*, *Estimates of the severity of coronavirus disease 2019: a model-based analysis*, 20 THE LANCET INFECTIOUS DISEASES 669 (June 1, 2020), <https://bit.ly/37YOD46>.

¹⁴ *Supra*, WHO IS AT INCREASED RISK FOR SEVERE ILLNESS?, <https://bit.ly/381QIS2>.

they were to become infected.¹⁵ When the country is taken as a whole, the percentage of adults over the age of 18 considered at a higher-risk for serious complications from COVID-19 is 37.6%. These statistics can lead to an alarming conclusion that simply are not substantiated by the actual facts of the disease progression, as discussed below.

9. As of June 17th, North Carolina had 46,855 lab confirmed COVID-19 cases, which has led to 1,168 deaths¹⁶; 29,219 patients have presumed recovered, leaving a presumed 16,468 patients with active COVID-19 infections.¹⁷ There is no cumulative tally on the patients who have been hospitalized, but as of June 17th, there are 846 COVID-19 positive patients that are currently hospitalized in the state.¹⁸ Overall, 69% of all the COVID-19 patients who died in North Carolina had at least one significant underlying medical condition. Moreover, 82% of all the deaths were in patients over the age of 65.¹⁹ Nursing home and residential care facility cases account for 5,197 positive cases and 704 deaths.²⁰

10. To put this data into perspective, the current mortality rate of the 41,658 COVID-19 positive patients that reside outside of a long-term care facility is only 1%. Moreover, if the

¹⁵ Wyatt Koma, *et al.*, *How Many Adults Are at Risk of Serious Illness If Infected with Coronavirus? Updated Data*, KFF (Apr. 23, 2020), <https://bit.ly/383aVlc>.

¹⁶ CASES, NCDHHS COVID-19 (last visited June 25, 2020), <https://bit.ly/3eCxH5R>.

¹⁷ *COVID-19 Patients Presumed to be Recovered*, NC DEP'T OF HEALTH AND HUMAN SERVICES (updated June 22, 2020), <https://bit.ly/3i3e3C7>.

¹⁸ HOSPITALIZATIONS, NCDHHS COVID-19, (last visited June 25, 2020), <https://bit.ly/2Nvjbkku>.

¹⁹ *Risk Factors for Severe Illness from COVID-19*, NC DEP'T OF HEALTH AND HUMAN SERVICES (updated June 23, 2020), <https://bit.ly/2Z9Kgir>.

²⁰ OUTBREAKS AND CLUSTERS, NCDHHS COVID-19 (last visited June 25, 2020), <https://bit.ly/3g51wfT>.

exact number of asymptomatic patients were known and incorporated into the calculation, the mortality rate would be even lower.²¹ There is a presumed 16,468 patients with active COVID-19 infections, however only 846 of these patients are hospitalized currently. Thus, it can be inferred that only 5% of the current active infections are severe enough to require hospitalization, which is far lower than the 39% considered at higher-risk for serious complications. This closely mirrors the CDC scenario mentioned above, with a symptomatic case hospitalization ratio of only 3.4%.²²

2. Are there mitigation measures that North Carolina voters can take that would make it safe to vote in-person in North Carolina in the fall?

11. Mitigation measures can be implemented to make voting in-person safe for voters. Individual voters are now more practiced in maneuvering in a protective mode of operation, which would add to the overall safety of the voting experience. By wearing a mask, using hand sanitizer, keeping a safe distance from others and refraining from touching their nose, mouth, and face at the polling station, voters can essentially eliminate the risk of catching the virus while voting in person. As mentioned above, the virus can only spread two ways: namely, person to person close-range contact and indirect infection through contact with an infected surface, then touching your eyes, nose or mouth. If voters take the necessary precautions, then these two methods of transmission can be controlled and the risk of transmission approaches zero. From a poll management standpoint, there can be safety strategies implemented similar to those of essential businesses, such that the risk to both the voter and the poll workers is minimized.

²¹ Gail Dutton, *Multiple Studies Suggest COVID-a9 Mortality Rate May Be Lower Than Expected*, BIOSPACE (May 7, 2020), <https://bit.ly/2BKhz3x>.

²² *Supra* CORONAVIRUS DISEASE 2019 PANDEMIC PLANNING SCENARIOS, <https://bit.ly/3fYrWzB>.

12. Guiding principles from the CDC state that the risk of spreading COVID-19 during a gathering is dependent on the level of community transmission at that time, as well as the number and length of interactions between people during the event.²³ Guidelines for implementation of community mitigation efforts are clearly outlined by the CDC.²⁴ When put into place, these strategies help to reduce the spread of the disease and keep people safe when in public places.

13. The spread of respiratory viruses can be lessened through several interventions. Basic hand hygiene is of paramount importance and hand washing with soap and water or using alcohol-based gels are proven effective in preventing disease transmission. Practicing social distancing, that is maintaining at least 6 feet of distance from other people, limits opportunities to encounter infected people. In New York, social distancing implementation decreased the number of daily contacts from an average of 75 contacts to 5 contacts per day.²⁵ Social distancing policies have been shown to substantially slow the spread of COVID-19 in the U.S.²⁶ Physical distancing is likely independently associated with a reduced risk of transmission. In a meta-analysis of observational studies evaluating the relationship between physical distance and

²³ CORONAVIRUS DISEASE 2019 CONSIDERATIONS FOR EVENTS & GATHERINGS, CDC (last visited June 25, 2020), <https://bit.ly/2B0EQhX>.

²⁴ CORONAVIRUS DISEASE 2019 COMMUNITY MITIGATION FRAMEWORK, CDC (last visited June 25, 2020), <https://bit.ly/2Nxel6q>.

²⁵ Michiel Bakker, *et al.*, *Effect of social distancing measures in the New York City metropolitan area*, MIT CONNECTION SCIENCE (Mar. 29, 2020), <https://bit.ly/381It2X>.

²⁶ Charles Courtemanche, *et al.*, *Strong Social Distancing Measures In The United States Reduced The COVID-19 Growth Rate*, HEALTHAFFAIRS (May 14, 2020), <https://bit.ly/2VjHndI>; Calistus N Ngonghala, *et al.*, *Mathematical Assessment of the Impact of Non-Pharmaceutical Interventions on Curtailing the 2019 Novel Coronavirus*, 325 NAT'L LIBRARY OF MEDICINE (2020), <https://bit.ly/2CIeuSh>.

transmission of SARS-CoV-2, proximity and risk of infection were closely associated, and the infection rate was higher with contact within three feet compared to contacts beyond three feet (12.8 versus 2.6 %). Moreover, greater than six feet of distance was associated with an even further reduction in viral transmission.²⁷

14. The use of face masks as a preventative measure is recommended by the WHO to help mitigate the transmission of SARS-CoV-2.²⁸ A systematic review of 19 randomized controlled trials found that universal face mask use was beneficial and likely to have a significant impact on pandemic spread in the community, where transmission may be pre-symptomatic. Face mask use was beneficial for both well patients (worn to protect oneself when in contact with others) and also provided some degree of source control (worn by an infected individual to prevent transmission).²⁹ Another systematic review and meta-analysis of 21 studies reaffirmed the effectiveness face masks in preventing the transmission of respiratory viral infections. Moreover, masks worn by non-health care workers can reduce the risk of viral infection by 56% in non-household settings, such as out in the public or at a polling location.³⁰

²⁷ Derek K Chu, MD, *et al.*, *Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis*, THE LANCET (June 1, 2020), <https://bit.ly/31etP7j>.

²⁸ ADVICE ON THE USE OF MASKS IN THE CONTEXT OF COVID-19, WHO (June 5, 2020), <https://bit.ly/3dB05Uu>.

²⁹ C. Raina MacIntyre and Abrar Ahmad Chughtai, *A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients*, 108 INT'L J. NURS. STUD. (Apr. 30, 2020), <https://bit.ly/2YvV9Mq>.

³⁰ Mingming Liang, *et al.*, *Efficacy of face mask in preventing respiratory virus transmission: A systematic review and meta-analysis*, TRAVEL MEDICINE AND INFECTIOUS DISEASE (May 20, 2020), <https://bit.ly/3dCDln8>.

15. Essential businesses, such as grocery and hardware stores, remained open during the stay-at-home executive orders, utilizing safety restrictions that protected the public from infection. As states began the process of reopening, these same restrictions became a condition of operation for non-essential businesses, such as outdoor dining, community pools, golf courses, parks, etc., as further evidence of their effectiveness in keeping the public safe. Therefore, voters simply must follow the protocols they have been exercising since the start of COVID-19 mitigation. In addition, the CDC has a “Hierarchy of Controls” for managing workplace safety and occupational hazards.³¹ This is a framework that has kept people and workers safe since 2015 and earlier. Essential businesses have also paved the way and fine-tuned processes to keep their employees and customers safe during this outbreak. Both protocols can be extrapolated to polling locations to keep voters and poll workers safe. States have anticipated that their voters have both a need and preference for in-person voting to ensure their voting right is not disenfranchised. As such, in-person voting protocols published by Election Infrastructure Government Coordinating Council and Subsector Coordinating Council’s Joint COVID Working Group establish a clear roadmap of procedures and roles necessary to drive the risk of infection to zero.³²

16. Several news reports have sensationalized headlines indicating that a number of people were infected with COVID-19 and also voted in person during this past primary

³¹ THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH), CDC (last visited June 25, 2020), <https://bit.ly/2YBd1FY>.

³² *Health and Safety at the Polling Place*, CISA (May 28, 2020), <https://bit.ly/2Ywi3n4>; *Considerations for Modifying the Scale of In-Person Voting*, CISA (May 28, 2020), <https://bit.ly/2BIvK9f>; CORONAVIRUS DISEASE 2019 ELECTION POLLING LOCATIONS, CDC (updated June 22, 2020), <https://bit.ly/3dyulj3>.

election.³³ However, a close reading of the body of such journalistic reports indicate that the Department of Health Services admits that those voters who became infected were also exposed elsewhere. It follows that there is no direct, undisputed fact that a voter became infected during the voting process.

17. Recently, protests in support of Black Lives Matter have erupted throughout the country, and there were concerns about the spread of COVID-19. A paper from the National Bureau of Economic Research demonstrated “that the protests had little effect on the spread of COVID-19 for the entire population of the counties with protests during the more than three weeks following protest onset.”³⁴ This counters the predictions that the protests would bring broad negative public health consequences and demonstrates that people can remain relatively safe in a wide variety of settings. They found that “public speech and public health did not trade off against each other during protests” and it is likely that this would be similar for the public’s right to vote.

18. The actual risk of an infection spreading at a polling location cannot be determined with any degree of accuracy. However, for someone who wears a mask, maintains social distancing, brings their own pen, uses hand sanitizer, and avoids touching their face, the risk approaches zero. Moreover, there is no evidence to suggest that an election polling location would lead to a substantially higher risk of contracting COVID-19, as compared to another public place, so long as there is adherence to proper protocols and procedures. High-risk people should not overly expose themselves to situations that could put them at risk, however this is true

³³ David Wahlberg, *71 people who went to the polls on April 7 got COVID-19; tie to election uncertain*, WISCONSIN STATE J. (May 16, 2020), <https://bit.ly/2VlGy4f>.

³⁴ Dhaval M. Dave, et al., *Black Lives Matter Protests, Social Distancing, and COVID-19*, NAT’L BUREAU OF ECON. RESEARCH (June 2020), <https://bit.ly/3i2rSRo>.

whether it be at a polling place or a grocery store. Absentee ballots, which are available in North Carolina, can be used to help minimize their exposure.

19. Importantly, these mitigation strategies can be implemented by individuals themselves. Voters can wear masks, avoid crowds, bring their own hand sanitizer with them, practice frequent hand hygiene, and avoid touching their face. Doing so will bring their risk of transmission of the virus close to zero.

3. Can individuals vote safely through an absentee ballot process that requires voters to obtain the signature of one witness provided safety measures are utilized?

20. The utilization of absentee ballots allows people to safely participate in the election process and should likely be the recommended voting mechanism for high-risk voters.

21. North Carolina law now provides for online absentee ballot requests and requires only one signatory witness to complete the process.³⁵ Standard precautions, as indicated earlier, will mitigate the threat of contagion. It is worth noting that witnessing can be conducted at a distance, through a window or outdoors. Any or all of these variations would further reduce risk of infection. The CDC's only suggestion for the workers handling mail-in ballots is that they should practice hand hygiene frequently.³⁶

4. How certain is the data and literature on the future projected trajectory of the COVID-19 virus leading into the fall elections?

22. There is no certainty with respect to the projected trajectory of the COVID-19 virus leading into the fall elections. Models do not produce precise quantitative predictions about

³⁵ Julia Harte, *North Carolina to expand absentee voting access in 2020 elections*, REUTERS (June 11, 2020), <https://reut.rs/2BKmGRh>.

³⁶ *Supra*, CORONAVIRUS DISEASE 2019 ELECTION POLLING LOCATIONS, <https://bit.ly/3dyulj3>.

the extent and duration of disease burdens. However, models can be useful to estimate the relative effect of various interventions (e.g. wearing masks and social distancing) in reducing disease burden.

23. Consequently, any model that is fundamentally statistical in nature and one that yields wide confidence intervals is “not proscriptive for policy decisions”.³⁷

24. To support this point, the Institute for Health Metrics and Evaluation (IHME), as an independent global health research center at the University of Washington, designed a model as a planning tool for government officials outlining the possible trajectory of COVID-19 deaths and infections in their location, taking into account mobility, testing, population density, self-reported mask use, annual pneumonia death rate, and self-reported contacts.³⁸ Their model, first published on March 26, 2020 has been changed 4 times with the most recent changes implemented on June 10, 2020. We can reasonably expect that the model will change again as the IHME clearly indicates that they plan to do so.

25. Specifically, in North Carolina, their model projects a possible 2,782 deaths from COVID-19 to occur by October 1, 2020, however the range spans from 1,832 to 4,504.³⁹ They estimate a potential daily infection rate of 3,307 (range 664 to 10,883) by October 1st. This model has been criticized as the “projections are based not on transmission dynamics but on a statistical model with no epidemiologic basis.”⁴⁰

³⁷ Nicholas P. Jewell, PhD, *et al.*, *Caution Warranted: Using the Institute for Health Metrics and Evaluation Model for Predicting the Course of the COVID-19 Pandemic*, ANNALS OF INTERNAL MEDICINE (Apr. 14, 2020), <https://bit.ly/3829JOR>.

³⁸ COVID-19 MODEL FAQs, IHME (last visited June 25, 2020), <https://bit.ly/3ft37oK>.

³⁹ COVID-19 PROJECTIONS NORTH CAROLINA, IHME (updated June 24, 2020), <https://bit.ly/2Z7Oebz>.

⁴⁰ *Supra*, Jewell, *Caution Warranted*, <https://bit.ly/3829JOR>.

26. Epidemiological models are often unique to the academic group which developed them and differ in terms of specific variables and assumptions used in the simulation. These models are most effectively used to help estimate the relative effect of various interventions in reducing disease and are not designed to produce precise quantitative predictions about extent or duration of disease burdens.⁴¹ Models cannot predict the exact trajectory of epidemics in the future, as long-term mortality projections have already shown significant volatility. “Estimates that emerge from modeling studies are only as good as the validity of the epidemiological or statistical model used; the extent and accuracy of the assumptions made; and, perhaps most importantly, the quality of the data to which models are calibrated.”⁴² As, we are still continually learning about the unpredictable behavior of SARS-CoV-2 and controversy remains over many aspects of the infection which are required variables in the models, short-term projections are the most that can be expected with reasonable accuracy. In fact, the majority of models are currently not even projecting into the fall.

27. It cannot be emphasized enough that models elicit an appearance of certainty that does not exist. Experienced modelers know this and reserve the right to continuously change their models. The consumer of model outcomes must be cautious and well advised before assuming prediction is reality.

CONCLUSION

28. In summation, there is no substantial risk to voters for COVID-19 infection provided CDC guidelines are adhered to by individuals at polling locations. These guidelines

⁴¹ Nicholas P. Jewell, PhD, Joseph A. Lewnard, PhD, and Britta L. Jewell, PhD, *Predictive Mathematical Models of the COVID-19 Pandemic*, JAMA NETWORK (Apr. 16, 2020), <https://bit.ly/2Vhkzvu>.

⁴² *Id.*

have proven effective during the height of the outbreak and continue to have a mitigating effect as the infection rate wanes and diagnostic, treatment and therapeutic remedies advance. US Citizens have safely carried out essential activities (e.g. food shopping) throughout this crisis under these guidelines and are now better educated and trained on how to protect themselves from COVID-19 and other contagious diseases that are endemic in our society. If individual voters take the necessary precautions as when they carry out essential activities, then the risk of virus transmission is close to zero. Efforts must be made to protect the most medically vulnerable and therefore continued programs that promote absentee balloting for those so compromised would be an important service. Finally, we must recognize that models do not produce precise quantitative predictions, rather yield wide confidence intervals which minimizes their utility for policy decisions.

29. I hold all my opinions with a reasonable degree of medical probability.

30. This report is not intended to be a complete or final statement of my opinions, and I reserve the right to expand, modify or otherwise amend my opinions as the discovery process proceeds.

Executed on June 25, 2020

Theodore Plush

Theodore Plush, D.O.

THEODORE (TED) J. PLUSH, D.O.

2 Shelter Rock Place, Moorestown, NJ 08057. Phone: 484.832.6566. E-Mail: plusht@ihn.org

Professional Profile

- Doctor of Osteopathic Medicine focused on the complexities of patient needs in the area of pulmonary and critical care medicine.
- Recognized as a creative problem solver in Medical ICU and critical care situations.
- Proven team player with a genuine and outgoing personality that develops rapport with colleagues and patients alike.
- Demonstrated expertise in bronchoscopy, endobronchial ultrasound (EBUS) bronchoscopy, radial probe, cryotherapy, electrocautery, invasive procedures (central and arterial line placement, thoracentesis, paracentesis, chest tube placement), airway management, extracorporeal membrane oxygenation (ECMO) management and critical care ultrasound.
- Board Certified:
 - American Board of Internal Medicine (08/2016)
 - American Board of Internal Medicine - Pulmonary Disease (10/2017)
 - American Board of Internal Medicine - Critical Care Medicine (12/2018)

Experience

Inspira Medical Center- Pulmonary Medicine Attending

07/18 – Current

- Pulmonary Medicine Attending - Inspira Medical Group
 - Expert proceduralist utilizing advanced bronchoscopic techniques for diagnosis and therapeutics in a variety of pulmonary diseases
 - Currently working on the planning stages of a comprehensive lung cancer center to serve the patients of South New Jersey

Inspira Medical Center- Critical Care Attending

07/18 – Current

- Critical Care Medicine Attending - Cooper Health System
 - Associate professor in Critical Care Medicine
 - Member of the Sepsis committee charged with developing protocols aimed at improving outcomes in sepsis patients

Lankenau Medical Center- Pulmonary Critical Care Fellow

07/15 – 06/18

- Faced with the complexity of sub-massive PE patients, I was responsible for coordinating and developing the PE response team (PERT), significantly improving collaboration of care for these at-risk patients.
- Member of crucial health system-wide committees:
 - Antibiotic Stewardship Committee – *ICU Liaison*
 - Pulmonary Embolism Response Team – *Coordinator*
 - Length of Stay Committee – *Fellow representative*

Critical Care and Hospital Nocturnist

07/14 – 06/18

- Abington Memorial Hospital
- Riddle Memorial Hospital
- Bryn Mawr Hospital

Education

Residency

06/12 – 06/15

- Drexel University College of Medicine, Hahnemann University Hospital, Abington Memorial Hospital
- Selected Chief Internal Medicine Resident – promoted to Junior Faculty Position
- Critical Care Committee – Resident Liaison

Traditional Rotating Internship

07/11 – 06/12

- Roxborough Memorial Hospital
- Chestnut Hill Hospital

Philadelphia College of Osteopathic Medicine

08/07 – 06/11

- Cumulative GPA: 94 out of 100%
- Sigma Phi Osteopathic Honors and Service Fraternity.
- Vice President, Association of American Physicians and Surgeons. Co-Founder of PCOM chapter and program moderator for lectures and discussion series.
- Coordinator for PCOMpassion, student run, free clinic. Promoted its start up in West Philadelphia

West Chester University

06/04 – 12/06

- BS, Chemistry & Biology, Magna Cum Laude

Saint Joseph's University

08/02 – 05/04

Publications and Presentations:

Plush T, Greenspon L, Lande L. Rescue Therapies for Severe Acute Respiratory Distress Syndrome. *Clinical Pulmonary Med.* 2017 Sept; 24(5): 197-205.

Plush T, Shakespeare W, Jacobs D, Ladi L, Sethi S, Gasperino J. Cocaine-Induced Agitated Delirium: A Case Report and Review. *Journal of Intensive Care Med.* 2015 Jan; 30(1): 49-57.

Plush T, Isaac K, Kuntz C, Greenspon L. Massive Heparin-induced Thrombocytopenia-related Thrombosis Despite Two Negative Platelet Factor 4 Immunoassays - Presented at the American Thoracic Society National Meeting, May 2017 – Washington, D.C.

Plush T, Casanova-Ghosh E, Gnall E, Samuels L, Gregory S. Successful Use of ECMO Therapy Without Intravenous Heparin in a Patient with Acute Intracranial Hemorrhage and Severe ARDS - Presented at the American Thoracic Society National Meeting, May 2016 - San Francisco, CA